

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

## Folding/unfolding movements of hindwing and body morphological patterns in dung beetles

### This is the author's manuscript

*Original Citation:*

*Availability:*

This version is available <http://hdl.handle.net/2318/1564352> since 2016-06-04T20:15:23Z

*Publisher:*

Museum national d'Histoire naturelle de Paris

*Terms of use:*

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

### **Folding/unfolding movements of hindwing and body morphological patterns in dung beetles**

*Roggero A., Palestini C.*

*University of Torino, Department of Life Sciences and Systems Biology, Via Accademia Albertina 13, 10123 Torino, Italy  
(angela.roggero@unito.it)*

In Scarabaeidae some complex foldings allow to recover the hindwings below the elytra when at rest. The sclerotized articular parts and thoracic muscles help the processes of folding and unfolding. This research highlighted that the folding mechanism is basically the same in the studied taxa, and it is articulated in at least five steps. The geometric morphometrics approach was applied to examine the overall shape variation in various body parts by both landmarks and semilandmarks methods. The shape and size correlations between hindwing and other body structures - as the pronotum, abdomen and elytron - were examined in representatives taxa of two scarabaeid subtribes (Drepanocerina and Onthophagina). Similarities and differences in morphological and evolutionary patterns were discussed. The results show how the morphological pattern variations are increasing and decreasing following strict and precise correlations between size and shape evolution of the body and the hindwing.